

# **CAMELOT WATER ASSOCIATION (PWS 3140014) SOURCE WATER ASSESSMENT FINAL REPORT**

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**January 7, 2002**



## **State of Idaho Department of Environmental Quality**

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## Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

This report, *Source Water Assessment for Camelot Water Association, Nampa, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The Camelot Water Association drinking water system consists of two wells. Well #1 Upper has a moderate susceptibility rating to inorganic contaminants, volatile organic, synthetic organic, and microbial contamination. Well #2 Lower, the back-up well, has a high susceptibility rating to all contaminant types. The potential contaminant sources include commercial and industrial businesses in the center of downtown Nampa, and surrounding agricultural lands. Moderate to high hydrologic sensitivity and system construction scores influenced final susceptibility ratings.

Neither of the wells has recorded the presence of synthetic organic or volatile organic contamination during any water chemistry tests, nor has total coliform bacteria been detected in the system. There are no inorganic contaminant records for Well #2 Lower. The inorganic contaminants fluoride, chromium, and mercury have been detected in Well #1 Upper, but at levels below the current Maximum Contaminant Levels (MCL) set by the U.S. Environmental Protection Agency. Nitrate concentrations for both wells have been consistently below 2.3 parts per million (ppm). The MCL for nitrate is 10 ppm. Though there are no current significant problems with the drinking water system, the Camelot Water Association should be aware that the potential for contamination still exists. Though there is high agricultural chemical use county-wide, the two delineations encompass only urban land uses, so the county agricultural levels are not applicable in this case. The area has also been listed as an organics priority area for the synthetic pesticides atrazine and alachlor.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For Camelot Water Association, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system’s components and its capacity). No application or storage of herbicides, pesticides, or other chemicals is allowed within 50 feet of a public water system well. Since the delineations cross only urban and residential land, storm water drainage may be an important consideration. Much of the designated protection areas are outside the direct jurisdiction of Camelot Water Association, making collaboration and partnerships with state and local

agencies and industry groups critical to the success of drinking water protection. All wells should maintain sanitary standards regarding wellhead protection. Should microbial contamination become a problem, appropriate disinfection practices would need to be implemented. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineations contain some urban and residential land uses. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the U.S. Environmental Protection Agency. As there are major transportation corridors through the delineations, the Idaho Department of Transportation should be involved in protection activities.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Boise Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

# SOURCE WATER ASSESSMENT FOR CAMELOT WATER ASSOCIATION, NAMPA, IDAHO

## Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of these wells mean.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are included. The list of significant potential contaminant source categories and their rankings used to develop the assessment are also included.

### Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

### Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

## **Section 2. Conducting the Assessment**

### **General Description of the Source Water Quality**

The public drinking water system for the Camelot Water Association is comprised of two ground water wells that serve approximately 157 people through approximately 51 connections. The wells are located in Canyon County, on the west side of the City of Nampa (Figure 1).

Though there are no current significant water chemistry problems in the ground water, there have been detections in the tested well water of the inorganic contaminants (IOCs) fluoride, chromium, mercury, and nitrate at levels below the current Maximum Contaminant Levels (MCL) as set by the EPA. Total coliform bacteria have never been detected in the system water. No volatile organic contaminants (VOCs) or synthetic organic contaminants (SOCs) have been detected in the well water. Though the countywide use of agricultural chemicals is rated as high, the delineations only cross urban land uses, so a focus on agricultural sources is not as relevant. The delineations also encompass an SOC priority area for the pesticides atrazine and alachlor.

### **Defining the Zones of Contribution – Delineation**

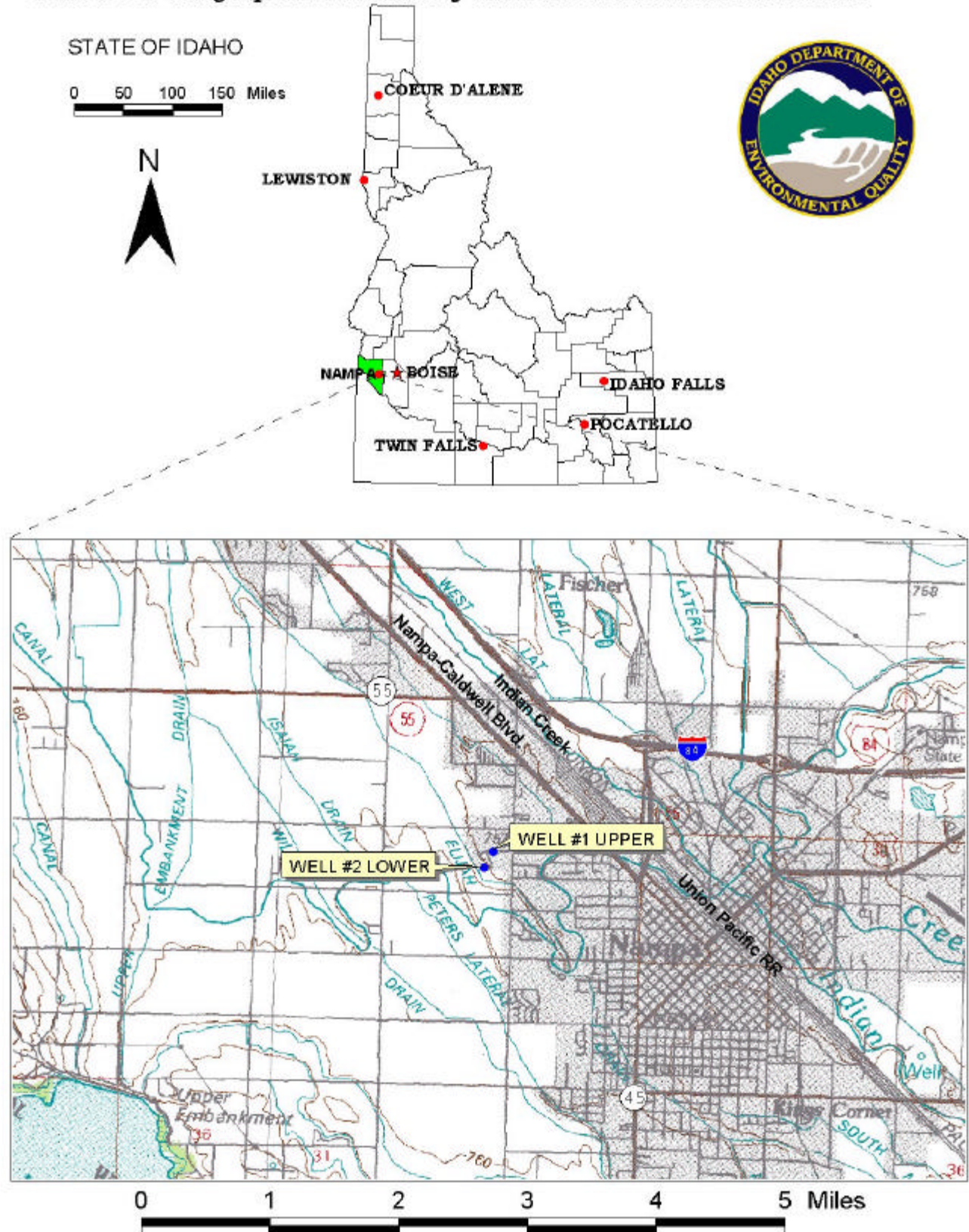
The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ contracted with BARR Engineering to perform the delineations using a combination of MODFLOW and a refined analytical element computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the Boise Valley aquifer in the vicinity of the Camelot Water Association. The computer models used site specific data, assimilated by BARR Engineering from a variety of sources including local area well logs, the Treasure Valley Hydrologic Project, and hydrogeologic reports (detailed below).

### **Treasure Valley Hydrologic Project Information (Petrich and Urban, 1996; Neely and Crockett, 1998; Petrich et al., 1999)**

The “Treasure Valley” is a geopolitical region that includes the lower Boise River sub-basin. The lower Boise River sub-basin begins where the Boise River exits the mountains near the Lucky Peak Reservoir. From Lucky Peak Dam the lower Boise River flows about 64 (river) miles northwestward through the Treasure Valley to its confluence with the Snake River. The Treasure Valley Hydrologic Project area encompasses the lower Boise River area, and extends south to the Snake River. The southern area is included in the study area because of ground water flow from the Lower Boise River basin south toward the Snake River.

Significant amounts of desert area were converted to flood irrigated agriculture beginning in the 1860s. Irrigation led to increases in shallow ground water levels in some areas. The shallow groundwater levels provided an inexpensive and readily obtainable water supply that is used extensively throughout the valley. Much of the population growth in the Treasure Valley has been occurring in previously flood-irrigated agricultural areas, resulting in increased pumpage and a reduction in local aquifer recharge. In addition, irrigation in some areas has become more efficient,

**FIGURE 1. Geographic Location of Camelot Water Association Inc.**



reducing the amount of irrigation-related infiltration. Decreasing aquifer recharge and increasing pumpage is thought to be contributing to decreasing ground water levels in some areas.

The Treasure Valley experiences a temperate and arid-to-semiarid climate. Average high temperatures range from about 90°F in summer to 36°F in winter; low temperatures range from about 20°F in winter to about 56°F in summer. The average precipitation ranges from about 8 to 14 inches throughout most of the valley, most of which falls during the colder months.

Major surface water bodies include the Boise River, Lake Lowell, and Lucky Peak Reservoir. The primary source of surface water in the Treasure Valley is precipitation falling in the high elevation area in the Boise River basin upstream of Lucky Peak Dam. Much of the runoff from high elevation areas is stored in three reservoirs: Anderson Ranch Reservoir, Arrowrock Reservoir, and Lucky Peak Reservoir.

The region's croplands are irrigated primarily with surface water through an extensive network of reservoirs and canals. The first canals were constructed in the 1860's; there are now over 1,100 miles of major and intermediate canals in the Treasure Valley. The primary sources of the irrigation water in the Treasure Valley include the Boise, Snake, and Payette Rivers. The majority of canals are owned and maintained by canal companies and irrigation districts.

### **Hydrogeology (from Petrich et al., 1999)**

The lower Boise River sub-basin (Treasure Valley) is located within the northwest-trending topographic depression known as the western Snake River Plain. The western Snake River Plain is a relatively flat lowland separating Cretaceous granitic mountains of west-central Idaho from the granitic/volcanic Owyhee mountains in southwestern Idaho. The western Snake River Plain extends from about Twin Falls, Idaho northwestward to Vale, Oregon. The Snake River Plain is about 30 miles wide in the section containing the lower Boise River.

Sediments originating from the surrounding mountains began accumulating on top of thick, basal basalts. Rifting and continued subsidence maintained the lowland topography, leading to the additional accumulation of water and sediments (Othberg, 1994). Basin infilling by sediments and basalt occurred from the late Miocene through the late Pliocene (Othberg, 1994). Incision caused by flowing water in major drainages (e.g., Snake and Boise Rivers) began in the late Pliocene or early Pleistocene, although deposition of coarse sediments continued during Quaternary glaciations (Othberg, 1994).

Several Quaternary basalt flows have been described in the western Snake River Plain, and have been assigned to the upper Snake River Group (Malde, 1991; Malde and Powers, 1962). Lava flowed across portions of the ancestral Snake River Valley (Malde, 1991) in an area that is now south of the Boise River. The Snake River then changed course, incising at its present location along the southern margin of the basalt flows. More recent eruptions (from Kuna Butte and other local sources) spilled lava into the canyon south of Melba. The Snake River has since incised this basalt (Malde, 1991).

The general stratigraphy of the western Snake River Plain consists of (from top to bottom) a thick layer of sedimentary deposits underlain by a thick series of basalt flows, which in turn are underlain by older, tuffaceous sediments and basalt (Malde, 1991; Clemens, 1993). The upper thick zone of sediments (up to approximately 6,000 feet thick) distinguishes the western Snake River Plain from the eastern

Snake River Plain, in which the upper section is primarily Quaternary basalt (Wood and Anderson, 1981).

The uppermost sediments and basalt belong to the Pleistocene-age Snake River Group. The Snake River Group consists of terrace sediments, Quaternary alluvium, and Pleistocene basalt flows (Wood and Anderson, 1981). Snake River Group sediments and basalts cover much of the project area (Othberg and Stanford, 1992).

The Snake River Group overlies the Idaho Group sediments. The Idaho Group sediments can be divided into two general parts (Wood and Anderson, 1981). The lower Idaho Group contains sediments described as lake and stream deposits of buff white, brown, and gray sand, silt, clay, diatomite, numerous thin beds of vitric ash, and some basaltic tuffs. The upper part of the lower Idaho Group also contains some local, thin, basalt flows. The upper Idaho Group consists of sands, claystones, and siltstones, but differs from the lower Idaho Group in that it contains a greater percentage of coarser-grained materials. The upper Idaho Group are associated with a fluvial/deltaic/lacustrine depositional environment; the lower Idaho Group sediments were deposited in more of a lacustrine/deltaic environment (Wood, 1994).

Wood (1994) identified a buried lacustrine delta within the Idaho Group sediments in the Nampa-Caldwell area. The location of the delta in the middle of the western Snake River Plain suggests that the eastern part of the Boise River basin was delta plain and flood plain at the time of deposition, while the western part was a deep lake environment. The delta probably prograded northwestward into a lake basin 830 feet deep, based upon high resolution seismic reflection data and resistivity log interpretations. The delta-plain and front sediments were shown to be mostly fine-grained, well-sorted sand with thin layers of mud (Wood, 1994). The northwest trend of the delta indicates a sediment source to the southeast, such as where the Snake River flows today (Wood, 1994).

A substantial, laterally extensive layer of clay is found at depths of 300 to 700 feet below ground surface. The clay is important because it represents, in some areas, a significant aquitard separating shallow overlying aquifers from deeper zones. The clay, often described in well logs as having a blue or gray color, has been observed as far west as Parma, and as far east as Boise (although the clay is not found in the extreme eastern portions of the Treasure Valley). The clay varies from a few feet to a few hundred feet in thickness. Although significant layers of clay are present throughout the Idaho Group sediments, individual clay units are not necessarily continuous over large areas. Also, the top of the clay can vary in elevation by up to approximately 200 feet in some locations, such as in an area west of Lake Lowell. In general, sediments above the “blue clay” are coarser-grained than the interbedded sands, silts, and clays underlying the “blue clay.”

The top of the upper Idaho Group is marked in several parts of the Treasure Valley by a widespread fluvial gravel deposit known as the Tenmile Gravels. Tenmile Gravels contain rounded granitic rocks and felsic porphyries originating from the Idaho Batholith to the north and northeast. The Tenmile Gravels range up to 500 feet in thickness along the Tenmile Ridge south of Boise, but are less than 50 feet thick in the Nampa-Caldwell area (Wood and Anderson, 1981).

## **Aquifer Systems and Hydrogeologic Characteristics**

Ground water for municipal, industrial, rural domestic, and irrigation uses in the Treasure Valley is drawn almost entirely from Snake River Group and Idaho Group aquifers. Many domestic wells draw water from shallow aquifers, such as those in the Snake River Group deposits. Larger production wells (for municipal and agricultural uses) draw water from the deeper Idaho Group sediments.

Aquifers contained in the Snake River and Idaho Group sediments comprise shallow and regional ground water flow systems. Shallow aquifers contained in Snake River Group sediments and basalts may belong to local flow systems. Most local flow system recharge stems from irrigation infiltration and channel (e.g., streams or canals) losses. Discharge from shallow, local flow systems often is to local drains or streams. The time from recharge to discharge in shallow flow systems (residence times) probably ranges from days to tens of years.

In contrast, regional ground water flow systems extend much deeper than local flow systems. The Treasure Valley regional flow system begins in the eastern part of the valley, as indicated by downward hydraulic gradients in the Boise Fan sediments described by Squires et al. (1992). Some water also enters the regional flow system as underflow from the Boise Foothills in the northeastern part of the valley. The regional flow system is thought to discharge primarily to the Boise and Snake Rivers in the western and southwestern parts of the valley.

Aquifer material characteristics, material heterogeneity, and structural controls influence Treasure Valley ground water flow. Coarse-grained materials (e.g., sand and gravel) in upper zones are more capable of transmitting ground water than fine-grained sediments (e.g., silt and clay). Clay and silt in the Snake River sediments can restrict vertical and/or horizontal ground water movement. Perched aquifers are created when fine-grained lenses impede downward vertical flow. A distinctive clay layer, sometimes referred to as "blue clay," is present over large portions of the valley. The clay is absent in the easternmost portions of the lower Boise River Basin, but can reach a thickness of more than 200 feet toward the central and western portions of the basin.

Sequences of interbedded sand, silt, and clay, such as the Deer Flat Surface and the upper portion of the Glens Ferry Formation of the upper Idaho Group in the Nampa-Caldwell area, are the major water-producing aquifers in a large part of Canyon County (Anderson and Wood, 1981). The coarse-grained sediments in this zone produce water in excess of 2,000 gallons per minute (gpm).

The delineated source water assessment areas for the Camelot Water Association can best be described as east-southeast trending corridors approximately 2 ½ miles long and ¼ mile wide (Figures 2 and 3). The actual data used by BARR Engineering in determining the source water assessment delineation areas are available from DEQ upon request.

## **Identifying Potential Sources of Contamination**

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of groundwater contamination. The

locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

Land use within the immediate area of the Camelot Water Association wellheads consists of residential uses, while the surrounding area is predominantly urban and commercial.

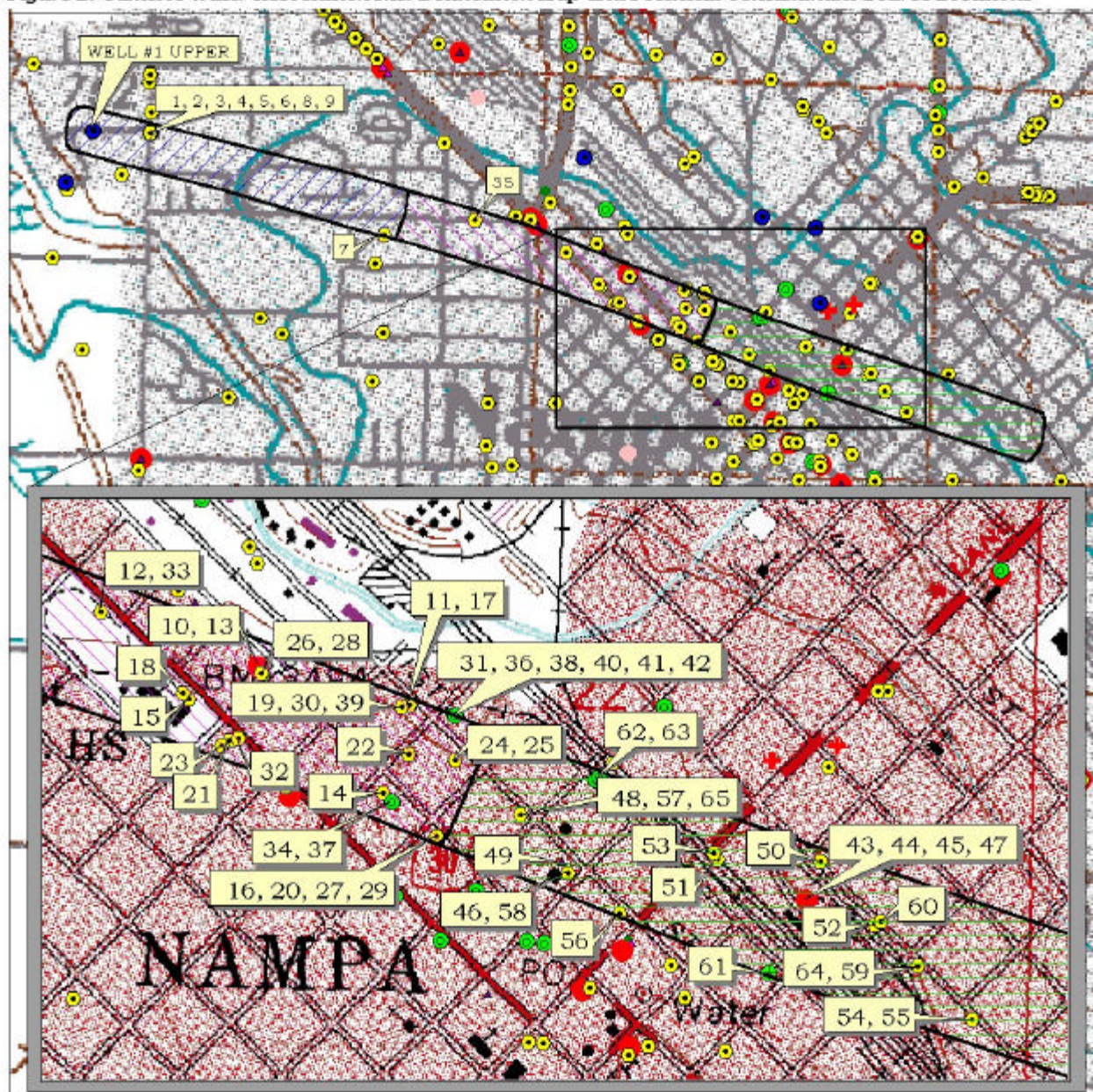
It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

### **Contaminant Source Inventory Process**

A two-phased contaminant inventory of the study area was conducted in October and November 2001. The first phase involved identifying and documenting potential contaminant sources within the Camelot Water Association source water assessment areas (Figures 2 and 3) through the use of computer databases and Geographic Information System maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the area.

The delineated source water areas contain transportation corridors (3<sup>rd</sup> Avenue, Highway 45, Union Pacific Railroad) as potential sources of contamination. A spill occurring on any of these transportation corridors could contribute all classes of contamination to the aquifer. In addition, the Well #1 Upper delineation (Figure 2, Table 1) contains 65 potential contaminant sources. These included leaking underground storage tanks (LUSTs), underground storage tanks (USTs), an aboveground storage tank (AST), multiple commercial and industrial sites, and sites regulated by the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), the Superfund Amendments and Reauthorization Act (SARA), and the Resource Conservation Recovery Act (RCRA). The Well #2 Lower delineation (Figure 3, Table 2) contains 49 potential contaminant sources, including similar types of sources.

Figure 2. Camelot Water Association Inc. Delineation Map and Potential Contaminant Source Locations



0 0.2 0.4 0.6 0.8 1 Miles



**PWS# 3140014**  
**WELL #1 UPPER**

**Table 1. Camelot Water Association Well #1 Upper, Potential Contaminant Inventory**

SITE #	Source Description <sup>1</sup>	TOT Zone <sup>2</sup> (years)	Source of Information	Potential Contaminants <sup>3</sup>
1, 2, 3, 4, 5, 6	Veterinarians	0-3	Database Search	IOC, SOC, Microbes
7	Photographers-Portrait	0-3	Database Search	IOC, VOC
8	General Contractors	0-3	Database Search	IOC, VOC, SOC
9	RCRA Site	0-3	Database Search	IOC, VOC, SOC
10	LUST-Site Cleanup Incomplete, Impact: Unknown	3-6	Database Search	VOC, SOC
11, 30	UST-Open; Oils-Fuel (Wholesale)	3-6	Database Search	VOC, SOC
12	UST-Open	3-6	GIS Map	VOC, SOC
13	UST-Closed	3-6	Database Search	VOC, SOC
14	Automobile Dealers-Used Cars	3-6	Database Search	IOC, VOC, SOC
15	Printers	3-6	Database Search	IOC, VOC
16, 20, 29	Veterinarians	3-6	Database Search	IOC, SOC
17	Automobile Body-Repairing and Painting	3-6	Database Search	IOC, VOC, SOC
18	Automobile Radiator-Repairing	3-6	Database Search	IOC, VOC, SOC
19	Oils-Fuel (Wholesale)	3-6	Database Search	VOC, SOC
21	Automobile Dealers-Used Cars	3-6	Database Search	IOC, VOC, SOC
22	Ornamental Metal Works	3-6	Database Search	IOC, SOC
23	Remodeling/Repairing Building Contractor	3-6	Database Search	IOC, VOC, SOC
24, 25	Toilets-Portable; Rental Service-Stores & Yards	3-6	Database Search	IOC, VOC, SOC
26, 28	Automobile Dealers-Used Cars; Automobile Repairing & Service	3-6	Database Search	IOC, VOC, SOC
27	Automobile Body Shop Equipment	3-6	Database Search	IOC, VOC, SOC
31	Oils-Fuel (Wholesale)	3-6	Database Search	VOC, SOC
32	Automobile Customizing	3-6	Database Search	IOC, VOC, SOC
33	Truck Renting & Leasing	3-6	Database Search	VOC, SOC
34, 37	Automobile Body- Repairing & Painting; RCRA Site	3-6	Database Search	IOC, VOC, SOC
35	Trucking	3-6	Database Search	VOC, SOC
36, 38, 42	RCRA Site; SARA Site	3-6	Database Search	IOC, VOC, SOC
39	SARA Site	3-6	Database Search	VOC, SOC
40, 41	SARA Site	3-6	Database Search	VOC, SOC
	3 <sup>rd</sup> Street	3-6	GIS Map	IOC, VOC, SOC
43, 44, 45	LUST-Site Cleanup Incomplete, Impact: Unknown; LUST-Site Cleanup Completed, Impact: GROUND WATER	6-10	Database Search	VOC, SOC
46	UST-Closed	6-10	Database Search	IOC, VOC, SOC
47	UST-Closed	6-10	Database Search	IOC, VOC, SOC
48, 57	UST-Closed; Fire Departments	6-10	Database Search	IOC, VOC, SOC
49	UST-Closed	6-10	Database Search	VOC, SOC
50	Taxicabs	6-10	Database Search	VOC, SOC
51	Building Contractors	6-10	Database Search	IOC, VOC, SOC
52	Automobile Machine Shop Service	6-10	Database Search	IOC, VOC, SOC
53	Tire-Dealers-Retail	6-10	Database Search	IOC, VOC

SITE #	Source Description <sup>1</sup>	TOT Zone <sup>2</sup> (years)	Source of Information	Potential Contaminants <sup>3</sup>
54	Automobile Repairing & Service	6-10	Database Search	IOC, VOC, SOC
55	Automobile Body- Repairing & Painting	6-10	Database Search	IOC, VOC, SOC
56	Tire-Dealers-Retail	6-10	Database Search	IOC, VOC
58	Hardware-Retail	6-10	Database Search	IOC, VOC
59, 64	Fire Protection Equipment & Supplies; SARA Site	6-10	Database Search	IOC, VOC
60	Railroads	6-10	Database Search	IOC, VOC, SOC
61	CERCLA Site	6-10	Database Search	IOC, VOC, SOC
62	RCRA Site	6-10	Database Search	IOC, VOC, SOC
63	RCRA Site	6-10	Database Search	IOC, SOC
65	AST	6-10	Database Search	IOC, VOC, SOC
	Union Pacific Railroad	6-10	GIS Map	IOC, VOC, SOC

<sup>1</sup> LUST = leaking underground storage tank, UST = underground storage tank, AST = aboveground storage tank, SARA = Superfund Amendment and Reauthorization Act,

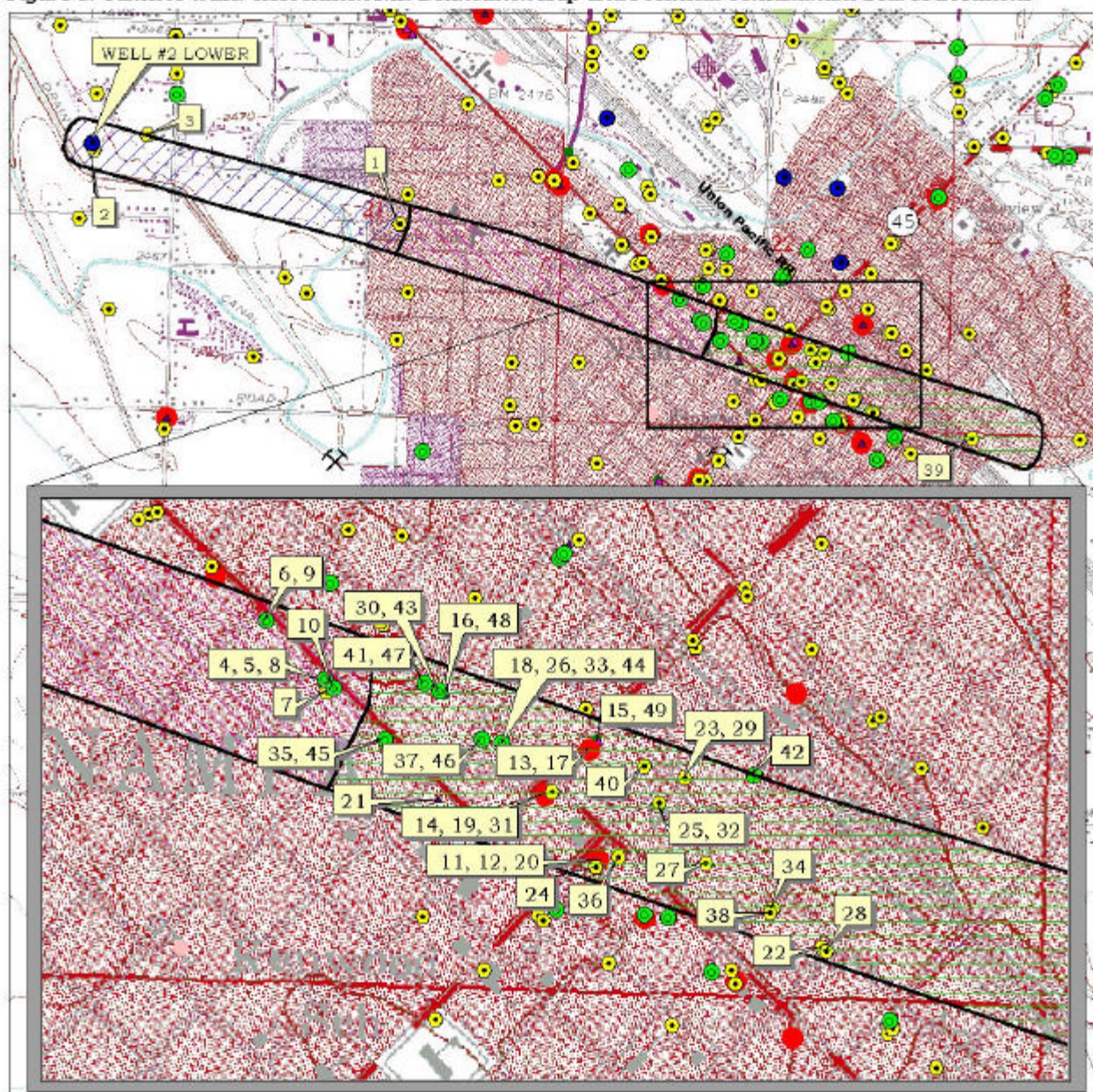
RCRA = Resource Conservation Recovery Act,

CERCLA = Comprehensive Environmental Response Compensation and Liability Act

<sup>2</sup> TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

<sup>3</sup> IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Figure 3. Camelot Water Association Inc. Delineation Map and Potential Contaminant Source Locations



0 0.2 0.4 0.6 0.8 1 Miles



**PWS# 3140014**  
**WELL #2 LOWER**

**Table 2. Camelot Water Association Well #2 Lower, Potential Contaminant Inventory**

SITE #	Source Description <sup>1</sup>	TOT Zone <sup>2</sup> (years)	Source of Information	Potential Contaminants <sup>3</sup>
1	Equipment-Rental	0-3	Database Search	IOC, VOC, SOC
2	Tree Service	0-3	Database Search	IOC, SOC, Microbes
3	Roofing Contractor	0-3	Database Search	IOC, VOC, SOC
4, 5, 8	UST – Closed; Automobile Dealers-New Cars; RCRA Site	3-6	Database Search	VOC, SOC
6, 9	Automobile Parts & Supplies-Retail; RCRA Site	3-6	Database Search	IOC, VOC, SOC
7	Paint-Retail	3-6	Database Search	IOC, VOC, SOC
10	RCRA Site	3-6	Database Search	VOC, SOC
	3 <sup>rd</sup> Street	3-6	GIS Map	IOC, VOC, SOC
11, 12, 20	LUST-Site Cleanup Incomplete, Impact: Unknown; LUST-Site Cleanup Incomplete, Impact: GROUND WATER; UST-Closed	6-10	Database Search	VOC, SOC
13, 17	LUST-Site Cleanup Incomplete, Impact: GROUND WATER; UST-Closed	6-10	Database Search	VOC, SOC
14, 19	LUST-Site Cleanup Incomplete, Impact: Potential; UST-Open	6-10	Database Search	VOC, SOC
15, 49	UST-Open; SARA Site	6-10	Database Search	IOC, VOC, SOC
16	UST-Open	6-10	Database Search	VOC, SOC
18, 33, 44	UST-Closed; Cleaners; RCRA Site	6-10	Database Search	VOC, SOC
21	UST-Closed	6-10	Database Search	VOC, SOC
22	Screen Printing	6-10	Database Search	IOC, VOC
23	General Contractors	6-10	Database Search	IOC, VOC, SOC
24	Bicycles-Dealers	6-10	Database Search	none
25	Janitors Supplies (Wholesale)	6-10	Database Search	VOC
26	Carpet & Rug Cleaners	6-10	Database Search	VOC
27	Printers	6-10	Database Search	IOC, VOC
28	Automobile Repairing & Service	6-10	Database Search	IOC, VOC, SOC
29	Concrete Contractors	6-10	Database Search	IOC, VOC, SOC
30, 43	Electric Motors-Dealer/Repairing; RCRA Site	6-10	Database Search	IOC, VOC
31	Electric Companies	6-10	Database Search	IOC, VOC
32	Artists-Commercial	6-10	Database Search	none
34	General Contractors	6-10	Database Search	IOC, VOC, SOC
35, 45	Automobile Dealers-New Cars; RCRA Site	6-10	Database Search	VOC, SOC
36	Floor Materials-Manufacturers	6-10	Database Search	IOC, VOC, SOC
37, 46	Automobile Nody-Repairing and Painting; RCRA Site	6-10	Database Search	IOC, VOC, SOC
38	Printers	6-10	Database Search	IOC, VOC
39	Storage-Household & Service	6-10	Database Search	IOC, VOC, SOC
40	Railroads	6-10	Database Search	IOC, VOC, SOC
41, 47	Automobile Repairing & Service; RCRA Site	6-10	Database Search	IOC, VOC, SOC

SITE #	Source Description <sup>1</sup>	TOT Zone <sup>2</sup> (years)	Source of Information	Potential Contaminants <sup>3</sup>
42	CERCLA Site	6-10	Database Search	VOC, SOC
48	SARA Site	6-10	Database Search	VOC, SOC
	Union Pacific Railroad	6-10	GIS Map	IOC, VOC, SOC

<sup>1</sup> LUST = leaking underground storage tank, UST = underground storage tank,

SARA = Superfund Amendment and Reauthorization Act, RCRA = Resource Conservation Recovery Act,

CERCLA = Comprehensive Environmental Response Compensation and Liability Act

<sup>2</sup> TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

<sup>3</sup> IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

### Section 3. Susceptibility Analyses

Each well's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment A contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

#### Hydrologic Sensitivity

The hydrologic sensitivity rating of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity is moderate for Well #1 Upper and high for Well #2 Lower (Table 3). The difference between the two wells is the overall soil type within the delineations. Regional soils data show that Well #1 Upper has predominantly (56%) poor to moderately drained soils, whereas Well #2 Lower has predominantly (53%) moderate to well-drained soils. Neither well has an available geologic log, so no determination could be made regarding depth of the water table, makeup of the vadose zone, or presence of thick low-permeability layers.

#### Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to

standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced. A sanitary survey was conducted in 2001.

Well #1 Upper has a high system construction score. Information regarding well construction is sparse without a well driller's report or lithologic log. The well, drilled in 1965, has 8-inch casing to 41 feet below ground surface (bgs). No information was provided regarding the annular seal material or depth. The static water table is located between 10 and 15 feet bgs. The 2001 sanitary survey indicates that the well seal needs replacement, the well house needs to be cleaned, and a screen needs to be installed. The well is protected from surface flooding as the casing extends 26" above the ground.

Well #2 Lower has a moderate system construction score. Information regarding well construction is sparse without a well driller's report or lithologic log. The well, drilled in 1975, has 8-inch casing to an unknown depth. No information was provided regarding the annular seal material or depth. The static water table is located between 7 and 10 feet bgs. The 2001 sanitary survey indicates that the well seal needs replacement and the well house needs to be cleaned. The well is protected from surface flooding as the casing extends 28" above the ground.

Without well logs, DEQ was unable to determine if current public water system (PWS) construction standards are being met. Though the wells may have been in compliance with standards when they were completed, current PWS well construction standards are more stringent. The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all PWSs to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Some of the regulations deal with screening requirements, aquifer pump tests, surface casing vent, and thickness of casing. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. Eight-inch diameter wells require a casing thickness of 0.322-inches. Since no well logs or driller's reports were available to answer these questions, the wells were assessed an additional point in the system construction rating.

### **Potential Contaminant Source and Land Use**

The wells rate moderate for IOCs (i.e. nitrates, arsenic), VOCs (i.e. petroleum products), and SOC (i.e. pesticides) and low for microbial contaminants (i.e. bacteria). Though each well has a large number of potential contaminant sources, most of the sources are found in the 6- and 10-year TOTs. Additionally, the delineations do not cross any agricultural land uses and local business sources and major transportation corridors contribute the majority of points to the land use score. In addition, the delineations cross an organics priority area for the SOC pesticides atrazine and alachlor.

### **Final Susceptibility Ranking**

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Additionally, storing potential contaminant sources within 50 feet of a wellhead will lead to an automatically high susceptibility rating. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0-

to 3-year time of travel zone (Zone 1B) and agricultural land contribute greatly to the overall ranking. In terms of total susceptibility, Well #1 Upper rates moderate for all categories. Well #2 Lower rates high for all categories.

**Table 3. Summary of Camelot Water Association Susceptibility Evaluation**

Well	Susceptibility Scores <sup>1</sup>									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1 Upper	M	M	M	M	L	H	M	M	M	M
Well #2 Lower	H	M	M	M	L	H	H	H	H	H

<sup>1</sup>H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,  
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

### Susceptibility Summary

Well #1 Upper rates moderate for all categories. Well #2 Lower rates high for all categories. Lack of well log information contributed the most to these scores. If such information could be provided, it is possible that the overall scores could be lowered.

Though there are no current significant water chemistry problems in the ground water, there have been detections in the tested well water of the IOCs fluoride, chromium, mercury, and nitrate at levels below the current MCLs as set by the EPA. Total coliform bacteria have never been detected in the system water and finally, no VOCs or SOCs have been detected in the well water. Though the countywide use of agricultural chemicals is rated as high, the delineations only cross urban land uses, so a focus on agricultural sources is not as relevant. The delineations do encompass an SOC priority area for the pesticides atrazine and alachlor.

## Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For Camelot Water Association, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey. No application or storage of herbicides, pesticides, or other chemicals should be allowed within 50 feet of a public water system well. Since the delineations cross only urban and residential land, storm water drainage may be an important consideration. Much of the designated protection areas are outside the direct jurisdiction of Camelot Water Association, making collaboration and partnerships with state and local agencies and industry groups critical to the success of drinking water protection. All wells should maintain sanitary standards regarding wellhead protection. Should microbial contamination become a problem,

appropriate disinfection practices would need to be implemented. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineations contain some urban and residential land uses. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the U.S. EPA. As there are transportation corridors through the delineations, the Idaho Department of Transportation should be involved in protection activities.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Boise Regional Office of the DEQ or the Idaho Rural Water Association.

### **Assistance**

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Boise Regional DEQ Office                      (208) 373-0550

State DEQ Office                                      (208) 373-0502

Website: <http://www.deq.state.id.us>

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper, Idaho Rural Water Association, at (208) 373-7001 ([mharper@idahoruralwater.com](mailto:mharper@idahoruralwater.com)) for assistance with drinking water protection (formerly wellhead protection) strategies.

## POTENTIAL CONTAMINANT INVENTORY

### LIST OF ACRONYMS AND DEFINITIONS

**AST (Aboveground Storage Tanks)** – Sites with aboveground storage tanks.

**Business Mailing List** – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

**CERCLIS** – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund, is designed to clean up hazardous waste sites that are on the national priority list (NPL).

**Cyanide Site** – DEQ permitted and known historical sites/facilities using cyanide.

**Dairy** – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

**Deep Injection Well** – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

**Enhanced Inventory** – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

**Floodplain** – This is a coverage of the 100-year floodplains.

**Group 1 Sites** – These are sites that show elevated levels of contaminants and are not within the priority one areas.

**Inorganic Priority Area** – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

**Landfill** – Areas of open and closed municipal and non-municipal landfills.

**LUST (Leaking Underground Storage Tank)** – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

**Mines and Quarries** – Mines and quarries permitted through the Idaho Department of Lands.)

**Nitrate Priority Area** – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

**NPDES (National Pollutant Discharge Elimination System)** – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

**Organic Priority Areas** – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

**Recharge Point** – This includes active, proposed, and possible recharge sites on the Snake River Plain.

**RICRIS** – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

**SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities)** – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

**Toxic Release Inventory (TRI)** – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

**UST (Underground Storage Tank)** – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

**Wastewater Land Applications Sites** – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

**Wellheads** – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

**NOTE:** Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

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## Attachment A

### Camelot Water Association Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

- 1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)
- 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5    Low Susceptibility

6 - 12   Moderate Susceptibility

≥ 13    High Susceptibility

## Ground Water Susceptibility Report

Public Water System Name :

CAMELOT WATER ASSN INC

Well# : WELL #1-UPPER

Public Water System Number 3140014

01/07/2002 2:39:33 PM

1. System Construction		SCORE			
Drill Date	01/01/1965				
Driller Log Available	NO				
Sanitary Survey (if yes, indicate date of last survey)	YES	2001			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	NO	1			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	YES	0			
Total System Construction Score		5			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	YES	0			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
Total Hydrologic Score		4			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	URBAN/COMMERCIAL	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	4	3	3	1
(Score = # Sources X 2 ) 8 Points Maximum		8	6	6	2
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
4 Points Maximum		1	1	1	
Zone 1B contains or intercepts a Group 1 Area	YES	0	0	2	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		9	7	9	2
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		3	3	3	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0
Cumulative Potential Contaminant / Land Use Score		16	14	16	4
4. Final Susceptibility Source Score		12	12	12	11
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate

1. System Construction		SCORE			
	Drill Date	01/01/1975			
	Driller Log Available	NO			
	Sanitary Survey (if yes, indicate date of last survey)	YES	2001		
	Well meets IDWR construction standards	NO	1		
	Wellhead and surface seal maintained	NO	1		
	Casing and annular seal extend to low permeability unit	NO	2		
	Highest production 100 feet below static water level	NO	1		
	Well located outside the 100 year flood plain	YES	0		
Total System Construction Score			5		
2. Hydrologic Sensitivity					
	Soils are poorly to moderately drained	NO	2		
	Vadose zone composed of gravel, fractured rock or unknown	YES	1		
	Depth to first water > 300 feet	NO	1		
	Aquitard present with > 50 feet cumulative thickness	NO	2		
Total Hydrologic Score			6		
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
	Land Use Zone 1A	URBAN/COMMERCIAL	2	2	2
	Farm chemical use high	NO	0	0	2
	IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
	Contaminant sources present (Number of Sources)	YES	3	2	1
	(Score = # Sources X 2 ) 8 Points Maximum		6	4	2
	Sources of Class II or III leacheable contaminants or	YES	1	0	
	4 Points Maximum		1	0	
	Zone 1B contains or intercepts a Group 1 Area	YES	0	0	0
	Land use Zone 1B Less Than 25% Agricultural Land		0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		7	4	7	2
Potential Contaminant / Land Use - ZONE II					
	Contaminant Sources Present	YES	2	2	
	Sources of Class II or III leacheable contaminants or	YES	0	1	0
	Land Use Zone II Less than 25% Agricultural Land		0	0	
Potential Contaminant Source / Land Use Score - Zone II		2	3	2	0
Potential Contaminant / Land Use - ZONE III					
	Contaminant Source Present	YES	1	1	1
	Sources of Class II or III leacheable contaminants or	YES	1	1	1
	Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0
Cumulative Potential Contaminant / Land Use Score		13	11	13	4
4. Final Susceptibility Source Score		14	13	14	13
5. Final Well Ranking		High	High	High	High